

PATENT

Atty. Dkt. No. AMAT/4213.P1/MASK/MA\$K-ETCH/ARNOLD S

REMARKS

This is intended as a full and complete response to the Final Office Action dated March 18, 2004, having a shortened statutory period for response set to expire on June 18, 2004. Claims 1-24 remain pending in the application and are shown above. Claims 1-24 stand rejected and claims by the Examiner. Reconsideration of the rejected claims is requested for reasons presented below.

Claims 1-24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kornblit et al.*, U.S. Patent No. 5,948,570 in view of *Meyer et al.*, U.S. Patent No. 4,600,686. The Examiner asserts that it would have been obvious to one with ordinary skill in the art to modify *Kornblit et al.* by using the compounds as taught by *Meyer et al.* Applicant respectfully traverses the rejection.

Kornblit et al. discloses etching a chromium layer with a gaseous mixture of oxygen gas, chlorine gas, and nitrogen as etchant species, in combination with a patterned organometallic resist. *Kornblit et al.* discloses that nitrogen is used in the etchant chemistry to dilute the oxygen gas and chlorine gas chemistry to minimize undercutting of the chromium layer and provide a more anisotropic etch pattern. *Kornblit et al.* discloses the use of oxygen gas and chlorine gas as specific etchant species, and an inert gas to dilute the etchant species. *Kornblit et al.* does not suggest or motivate the use of a carbon containing compound, such as carbon monoxide in etching a chromium layer, which carbon monoxide may form passivating deposits during an etching process to limit undercutting of a chromium layer as disclosed in the present invention.

Meyer et al. discloses depositing a chromium layer, depositing and patterning a photoresist, forming an etch resistant skin with a second chromium layer over the patterned photoresist, baking the substrate so that the chromium reacts with the photoresist, and etching the chromium layer. *Meyer et al.* disclose etchant species of carbontetrachloride (CCl_4) and oxygen gas. *Meyer et al.* further disclose carrier gases of argon and carbon monoxide. *Meyer et al.* does not suggest or motivate the combination of carbon monoxide and chlorine gas as etchant species in etching a chromium layer.

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The is no suggestion or motivation to combine the nitrogen passivation etchant chemistry of *Kornblit et al.* with the carbontetrachloride (CCl₄) etching gas of *Meyer et al.* Thus, there is no suggestion or motivation to selectively choose individual etchants from *Meyer et al.* and *Kornblit et al.* to form an etching gas; and the combination of *Meyer et al.* and *Kornblit et al.* does not teach, show, or suggest etching a chromium layer with carbon monoxide and chlorine gas.

The combination of *Meyer et al.* and *Kornblit et al.* does not teach, show, or suggest positioning the reticle on a support member in a processing chamber, wherein the reticle comprises a metal photomask layer formed on a silicon based substrate and a patterned resist material deposited on the metal photomask layer, introducing a processing gas comprising carbon monoxide and chlorine gas into the processing chamber, wherein the carbon monoxide and the chlorine gas have a molar ratio between about 1:9 and about 9:1, and delivering power to the processing chamber to generate a plasma and remove exposed portions of the metal photomask layer, as recited in claim 1, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

The combination of *Meyer et al.* and *Kornblit et al.* does not teach, show, or suggest positioning the reticle on a support member in a processing chamber, wherein the reticle comprises a chromium based photomask layer formed on an optically transparent silicon based material and a patterned resist material deposited on the chromium based photomask layer, introducing a processing gas comprising carbon monoxide and chlorine gas, wherein the molar ratio between carbon monoxide and chlorine gas is about 1:1, introducing an inert gas, maintaining a chamber pressure between about 2 milliTorr and about 25 milliTorr, delivering power to the processing chamber of about 700 watts or less to a coil disposed in the processing chamber to generate a plasma, and etching exposed portions of the chromium based photomask layer and selectively removing the chromium based photomask layer at a removal rate ratio of chromium based photomask layer to resist material of about 3:1 or greater, as recited in claim 13, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

The combination of *Meyer et al.* and *Kornblit et al.* does not teach, show, or suggest positioning the reticle on a support member in a processing chamber having a coil, wherein the reticle comprises a chromium based photomask layer formed on an optically transparent silicon based material and a patterned resist material deposited on the chromium based photomask layer, introducing a processing gas comprising carbon monoxide, chlorine gas, and an oxygen-containing gas into the processing chamber, wherein the molar ratio between carbon monoxide and chlorine gas is about 1:1, and the oxygen-containing gas comprises between about 5% and about 45% of the processing gas, introducing helium into the processing chamber, generating a plasma in the processing chamber, and etching exposed portions of the chromium based photomask layer and selectively removing the chromium based photomask layer at a removal rate ratio of chromium based photomask layer to resist material of about 3:1 or greater, as recited in claim 20, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

The secondary reference of *Yasuzato et al.* (US 5,750,290) made of record by the Examiner is acknowledged are noted. However, it is believed that the secondary reference is no more pertinent to the Applicant's disclosure than the primary references cited in the Final Office Action. Therefore, Applicant believes that a detailed discussion of the secondary references is not necessary for a full and complete response to this Final Office Action.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed. Having addressed all issues set out in the Final Office Action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,


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